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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,531	10/23/2003	Yasuhiro Izawa	116944	9115

25944 7590 11/29/2005
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EXAMINER

HANDAL, KAITY V

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/690,531

Applicant(s)

IZAWA ET AL.

Examiner

Kaity Handal

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☒ Claim(s) 20,21,40 and 41 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/2/2005, 9/17/2003 11-10-03
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

Page 21, line 15, the word "configure" needs to be replaced with the word "configured."

Page 12, line 33, the word "reformed" needs to be replaced with the word "reformer."

Appropriate correction is required.

2. The abstract of the disclosure is objected to because the mentioned nozzle is not claimed as part of the invention. Correction is required. See MPEP § 608.01(b).

3. Claims 20-21 and 40-41 are objected to because of the following informalities:

The word "temperature" is missing after "increasing the premixed fuel" and before "for the electrochemical reaction in the fuel cell". Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-4, 7-8, 11-12, 14-15, 22-24, 27-28, 31-32, and 34-35 are rejected under 35 U.S.C. 102(e) as being anticipated by Berlowitz et al. (US 2003/0082419 A1).

With respect to claims 1, 3-4, 22, and 24, Berlowitz teaches a fuel cell reformer system comprising: a pre-mixed fuel storing portion/emulsion container (fig. 2, 5) which includes a mixture state stabilizing means (agitator)/mixer (p2/paragraph [0018], lines 13-14 and paragraph [0017], lines 2-4), and an additive agent (emulsifier)/surfactant for making an even mixture of water and fuel to be supplied to a reformer (Illustrated) (p2, paragraph [0023]). Berlowitz further teaches a pre-mixed fuel supplying portion/outlet line (10). Though Berlowitz does not explicitly disclose a reformer containing a catalyst, such is inherent and necessary for a reformer to function.

Limitations recited in claims 3 and 24 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

Regarding limitations recited in claims 2, 11-12, 23, and 31-32 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an

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apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

With respect to claims 7-8 and 27-28, Berlowitz teaches a conventional fuel cell reforming system (fig. 1) where an independent material/water supplying portion/line (9) supplies the reformer (3) with independent material/water (illustrated).

Limitations recited in claims 8 and 28 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

With respect to claims 14 and 34, Berlowitz teaches a fuel cell system comprising a fuel reformer (fig. 2) and a fuel cell which generates electromotive force/provides start-up power to a vehicle (p1, paragraph [0007], lines 1-3).

With respect to claims 15 and 35, Berlowitz teaches a fuel cell system comprising a fuel cell system which generates an electromotive force/provides start-up power to a vehicle (p1, paragraph 0007], lines 1-3), and where the water supplied from the independent material supplying portion/line (9) contains water generated in the fuel cell (12) (p1, paragraph [0008], lines 21-31).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 19 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berlowitz et al. (US 2003/0082419 A1) in view of Epp (US 6,063,515).

With respect to claims 19 and 39, Berlowitz teaches all claim limitations as set forth above but fails to teach said system being comprised of a hydrogen separating portion which includes a hydrogen permeable membrane that selectively makes hydrogen permeate there through and which separates hydrogen in gas emitted from the fuel reforming apparatus using the hydrogen permeable membrane; and a hydrogen supplying portion which supplies the fuel cell with the hydrogen separated in the hydrogen separating portion; and a second combustion portion which burns gas that remains after separation of hydrogen in the hydrogen separating portion, wherein the water supplied from the independent material supplying portion contains water generated in the second combustion portion.

Epp teaches a fuel cell system (fig. 1) comprising a vaporizer (102) a reformer (104) and a hydrogen separating portion (112) which includes a hydrogen permeable membrane that selectively makes hydrogen permeate there through and

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which separates hydrogen in gas emitted from the fuel reforming apparatus using the hydrogen permeable membrane (col. 7, lines 51-56); and a hydrogen supplying portion (113) which supplies the fuel cell with the hydrogen separated in the hydrogen separating portion (col. 7, lines 60-65); and a second combustion portion/catalytic burner (107) which burns gas that remains after separation of hydrogen in the hydrogen separating portion (112) (col. 7, lines 60-65 and col. 8, lines 4-6). It is known in the art that water is a by-product of burners and therefore it would be obvious to supply the water produced to the independent material supplying portion. Epp teaches a hydrogen separating portion (112) in order to separate the hydrogen component from remaining components in the reformat stream (111).

It would have been obvious to one of ordinary skill in the art at the time the invention was to include a hydrogen separating portion in Berlowitz' modified fuel cell reforming system, as taught by Epp, in order to separate the hydrogen component from remaining components in the reformat stream.

3. Claims 9 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berlowitz et al. (US 2003/0082419 A1), as applied to claims 1 and 28 above, and further in view of Drnevich et al. (US 2003/0110693 A1).

With respect to claims 9 and 29, Berlowitz fails to teach where an independent material-supplying portion includes a gas supplying portion supplies the reformer with gas containing oxygen, and a humidifying portion which adds the water

generated in the system in a form of steam to the gas containing oxygen, that is to be supplied by the gas supplying portion to the reformer. Drnevich teaches a reforming reactor where a gas supplying portion supplies the reformer with gas containing oxygen, and a humidifying portion/(steam-oxygen mixture) and is to be supplied by the gas supplying portion to the reformer in order to convert residual methane to hydrogen and carbon monoxide (p1, paragraph [0011], lines 6-10).

It would have been obvious to one of ordinary skill in the art at the time the invention was to add humidifying portion/(steam-oxygen mixture) to the gas supplying portion to the reformer in Berlowitz, as taught by Drnevich, in order to convert residual methane to hydrogen and carbon monoxide.

4. Claims 5-6, 13, 20-21, 25-26, 33 and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berlowitz et al. (US 2003/0082419 A1), as applied to claims 1 and 22 above, and further in view of Epp et al. (US 6,063,515), and in view of Olsen, and in view of Inoue (US 2001/0049907 A1), and in view of Yamamuka et al. (US 6,273,957 B1).

With respect to claims 5-6, 13, 25-26 and 33, Berlowitz discloses all claim limitations as set forth above but fails to show where fuel cell reforming system containing a premixed fuel supplying portion which includes a vaporizing portion communicating with the reformer, a heating portion which supplies the vaporizing portion with heat for enabling the premixed fuel to be vaporized, and a spraying

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portion which sprays the premixed fuel stored in the premixed fuel storing portion into the vaporizing portion.

Epp teaches a fuel cell reforming system containing a premixed fuel supplying portion includes a vaporizing portion (103) communicating with the reformer (104) in order to flash vaporize water and fuel (col. 7, lines 19-21), a heating portion (108a) which supplies the vaporizing portion (103) with heat in order to promote the vaporization process (col. 7, lines 37-42) thereby avoiding hot spots in reformer due to direct heating (col. 3, lines 9-18).

It would have been obvious to one of ordinary skill in the art at the time the invention was to include a premixed fuel-supplying portion in Berlowitz' fuel cell reforming system, which includes a vaporizing portion communicating with the reformer, and a heating portion, as taught by Eppe, in order to flash and vaporize water and fuel and promote the vaporization process thereby avoiding hot spots in reformer due to direct heating.

Berlowitz as modified fails to teach a spraying portion which sprays the premixed fuel stored in the premixed fuel storing portion into the vaporizing portion.

Yamamuka teaches a spraying portion/spreay nozzle (7) which sprays the premixed fuel/solutions (1 to 3) contained in the premixed fuel storing portion/source materials vessels into the heated vaporizing portion (8) in order to achieve carburetion of source materials (col. 5, lines 34-40).

It would have been obvious to one of ordinary skill in the art at the time the invention was to spray the premixed fuel/solutions contained in the premixed fuel

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storing portion/source materials vessels into the heated vaporizing portion of modified Berlowitz, as taught by Yamamuka, in order to achieve carburetion of source materials.

Limitations recited in claims 6, 13, 26, and 33 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

With respect to claims 20-21 and 40-41, modified Berlowitz teaches all claim limitations as set forth above including a fuel cell which generates an electromotive force/provides start-up power to a vehicle (p1, paragraph 0007], lines 1-3). Modified Berlowitz fails to teach said system being comprised of a hydrogen extracting portion which includes a hydrogen permeable membrane that selectively makes hydrogen permeate there through and which separates hydrogen in gas emitted from the fuel reforming apparatus using the hydrogen permeable membrane; and the premixed fuel temperature increasing portion increases a temperature of the premixed fuel using the hydrogen extracted by the hydrogen extracting portion and supplies the hydrogen used for increasing the premixed fuel for the electrochemical reaction in the fuel cell.

Epp teaches a fuel cell system (fig. 1) comprising a vaporizer (103) a reformer (104) and a hydrogen separating portion (112) which includes a hydrogen permeable membrane that selectively makes hydrogen permeate there through and which separates hydrogen in gas emitted from the fuel reforming apparatus using the hydrogen permeable membrane (col. 7, lines 51-56); and a hydrogen supplying portion (113) which supplies the fuel cell with the hydrogen separated in the hydrogen separating portion (col. 7, lines 60-65). Epp teaches a hydrogen separating portion (112) in order to separate the hydrogen component from remaining components in the reformat stream (111).

It would have been obvious to one of ordinary skill in the art at the time the invention was to include a hydrogen separating portion in Berlowitz' modified fuel cell reforming system, as taught by Epp, in order to separate the hydrogen component from remaining components in the reformat stream.

Berlowitz as modified fails to show where the premixed fuel temperature increasing portion increases a temperature of the premixed fuel using the hydrogen extracted by the hydrogen extracting portion, and supplies the hydrogen used for increasing the premixed fuel for the electrochemical reaction in the fuel cell. Olsen teaches that recovering heat from exothermic processes can achieve great economies (Unit Processes and Principles of Chemical Engineering, Chapter I, page 4). It would have been obvious to have a premixed fuel temperature increasing portion which increases a temperature of the premixed fuel using the hydrogen extracted by the hydrogen extracting portion, and supplies the hydrogen used for

increasing the premixed fuel for the electrochemical reaction in the fuel cell in order to recover heat from the hydrogen extracted from the hydrogen extracting portion and utilize it to add heat to the premixed fuel temperature increasing portion as evidenced by Olsen.

Limitations recited in claims 20-21 and 40-41 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

5. Claims 16-18, and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berlowitz et al. (US 2003/0082419 A1), as applied to claims 15, 22 and 35 above, and further in view of Wertheim (US 4,902,586).

With respect to claims 16-17 and 36-37, Berlowitz discloses all claim limitations as set forth above but fails to show where the water supplied from the independent material supplying portion/line (9) contains water in exhaust gas emitted from an anode side of the fuel cell. Wertheim teaches a fuel cell reformer system where the water supplied from the independent material supplying portion contains water in

exhaust gas emitted from an anode/cathode side (col. 2, lines 23-40) of the fuel cell in order to eliminate a water recovery in the fuel cell (col. 2, lines 11-12).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the independent material supplying portion/line with water present in exhaust gas emitted from an anode/cathode side of the fuel cell in Berlowitz's fuel cell reforming system, as taught by Wertheim, in order to eliminate a water recovery in the fuel cell.

With respect to claims 18 and 38, Berlowitz discloses all claim limitations as set forth above but fails to show where the fuel cell system comprises a combustion portion which burns hydrogen that remains in exhaust gas emitted from an anode of the fuel cell and wherein the water supplied from the independent material supplying portion contains water generated in the first combustion portion. Wertheim teaches where the fuel cell system (fig. 1) comprises a combustion portion/burner (6) which burns hydrogen that remains in exhaust gas emitted from an anode (3) of the fuel cell and wherein the water supplied from the independent material supplying portion contains water generated in the first combustion portion (col. 2, lines 32-41) in order to remove hydrogen from the system and heat the gas stream (col. 2, lines 29-31) and in order to deem a water recovery system unnecessary (col. 2, lines 11-12).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a combustion portion in Berlowitz's fuel cell reforming system which burns hydrogen that remains in exhaust gas emitted from an anode of the fuel cell and wherein the water supplied from the independent material supplying

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portion contains water generated in the first combustion portion, as taught by Wertheim, in order to remove hydrogen from the system and heat the gas stream and deem a water recovery system unnecessary.

Allowable Subject Matter

6. Claims 10 and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the combination of a hydrogen permeable membrane in between a water passage and an oxygen passage which permeates steam into a reformer is not present in prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KH

11/9/2005

Alexa Neckel
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PRIMARY EXAMINER